0275] B. Immunization on Mucosal Surfaces

[0276] To generate optimal antibody responses in mucosal secretions, it is usually necessary to prime at a mucosal surface. To determine whether CTB would be a useful carrier protein for the induction of a mucosal antibody response, mice were immunized intranasally or intratracheally. The methods for intranasal and intratracheal immunization are described in Example 18. Intranasal immunization with cocaine-CTB induced significant levels of circulating cocaine-specific IgG, although the titers were lower than those seen following subcutaneous or intramuscular immunization. As with the routes of administration described in Part A of this example, doses of cocaine-CTB of 3-30 .mu.g all induced significant levels of cocaine-specific antibody. Simultaneous immunization by subcutaneous and intranasal routes induced antibody titers indistinguishable from those induced by the subcutaneous route alone. The feasibility of the intratracheal route Qf immunization was assessed by immunization with CTB alone. This route was also found to induce antigen-specific IgG in the serum (CTB-specific in this case). These data demonstrate that CTB is capable of inducing a systemic antigen-specific IgG response following immunization at a mucosal surface in the absence of any added adjuvant.

[0277] C. Induction of Cocaine-Specific Antibodies in Mucosal Secretions

[0278] To maximize protection against the addictive properties of cocaine, it is desirable to optimize the levels of cocaine-specific antibody at the sites of cocaine application (e.g. nasal and lung mucosa) as well as in the blood. Mice were immunized intranasally or subcutaneously with 10 .mu.g cocaine-CTB and were boosted using the same protocol on days 27 and 61. Following sacrifice on day 78, bronchial and nasal washes were collected as described in the Examples and assayed for cocaine-specific IgA and IgG. Anti-cocaine antibodies were detectable in both the nasal and bronchial washes using both immunization regimens. Intranasal immunization induced higher levels of antigen-specific IgA, while both routes were comparable at inducing anti-cocaine IgG responses in the mucosal secretions. The intranasal route of administration was also found to be the most effective route for the induction of antigen-specific IgA in the serum. Intratracheal immunization with CTB also induced CTB-specific IgA and IgG in the respiratory secretions. These data demonstrate that CTB is an effective carrier protein for the induction of an antigen-specific antibody response in the respiratory tract.